



SATHYABAMA

INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)

Accredited with 'A' grade by NAAC
Jeppiaar Naagar, Rajiv Gandhi Salai, Chennai - 600 119.
www.sathyabama.ac.in



DEPARTMENT OF BIOMEDICAL ENGINEERING

BOARD OF STUDIES – 2018 - 2019 (ODD Semester)

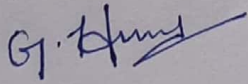
Minutes of the Meeting

03-07-2018

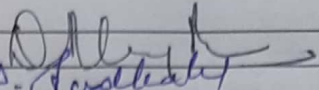
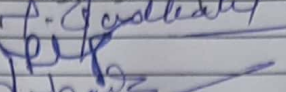
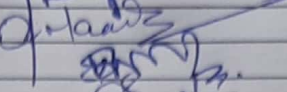
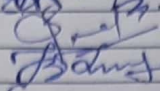
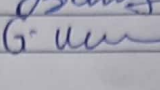
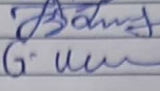
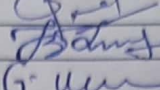
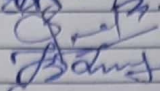
1. S24PROJ & S44PROJ has been divided into Phase I & Phase II, allocation of guides will be done during phase I and literature survey, methodology design and during phase II Execution of methodology, Observation and validation of results, submission of reports and final viva voce examination.
2. Project at the end of the semester should be such as to covers all the points of the concerned subject which he/she learns.
3. Professional training II S24PT2 has been included in order to gain the hands on and exposure to the industrial needs and acquired inplant training, NPTEL courses, industrial training, placement and hospital training.
4. Credits should be given for the Industrial Training and if required lab facilities can be provided to the students interested in doing the training in the campus during summer.
5. SBM1609 - Medical Optics and Laser Applications has been introduced as a CORE elective.
6. SBM1610 – Drug delivery systems has been chosen as CORE elective
7. SBMX1024 – Forensic Science Unit IV introduction to Handwriting, SBM1609 – Forensic toxicology was added

Members of Board of studies – Biomedical Engineering

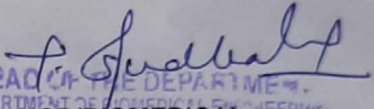
EXTERNAL MEMBERS

Dr. G. Harikrishnan, 
Associate Professor & Research Coordinator,
Department of Electrical & Electronics Engg.,
Sree Vidyanikethan Engg. College, Tirupati

INTERNAL MEMBERS

S.No.	Name of the Internal Member	Signature
1	Dr. Daniel Alex Anand	
2	Dr. T. Sudhakar	
2	Dr. J. Premkumar	
3	Dr. Anima Nanda	
4	Dr. S. Krishnakumar	
5	Ms. Sindu Divakaran	
6	Ms. Bethanne Janney	
7	Mr. G. Umashankar	

S.No.	Course Code	Course Name	Deleted Topics	Added Topics
1	SBMX1024	Forensic Science	UNIT-IV Introduction to examination of Handwriting – development of handwriting science – handwriting experts – expert witness in courts – relationship between investigating officers and handwriting experts – relevant sections of Indian Penal Code – criminal procedure code and evidence act	UNIT 4 TOXINS Forensic toxicology – poison and drugs, classifications, Source, nature, Actions and diagnosis of poisoning cases, postmortem findings and examination, treatment of poisoning cases, medico legal aspects; corrosive agents, irritants – mechanical and animal


 HEAD OF THE DEPARTMENT
 DEPARTMENT OF BIOMEDICAL ENGINEERING
SANTHABAMA
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 Jambhavanagar Rajiv Gandhi Salai
 Chennai - 600 096

SBMX1024	FORENSIC SCIENCE	L	T	P	CREDITS	TOTAL MARKS
		3	0	0	3	100

UNIT-I **10**

Cell and its inclusions – structure and function – types of cells; Blood & Body fluids – forensic significance – morphological identification of bones – forensic importance.

UNIT-II **10**

Identification of Human remains – methods of reconstruction – personal identity in the living and the dead – DNA fingerprinting – Blotting types (Southern, Northern, Western) – post mortem examination – poisoning – medico legal aspects.

UNIT-III **10**

Finger Prints – importance of plastic and visible finger prints – transfer methods of finger prints – fingerprint patterns – their classification – ridge characteristics – foot prints – importance – gait patterns and their characteristics – photography of foot prints – sunken and surface foot prints.

UNIT-IV **10**

Introduction to examination of Handwriting – development of handwriting science – handwriting experts – expert witness in courts – relationship between investigating officers and handwriting experts – relevant sections of Indian Penal Code – criminal procedure code and evidence act

UNIT-V **10**

Serology – basic principles of serology – concept of antigen and antibody and their reaction – application of serology in forensic science. Karyotyping – banding patterns - chromosomal abnormalities – sex determination – sex linked inheritance.

TOTAL NUMBER OF PERIODS: 50**TEXT BOOKS:**

1. De Robertis, "General Cytology", Sannders, 6th Edition, 2008 (Unit – I & V)
2. E J Gardner, "Principles of Genetics", Tata Mc Graw Hill, 7th Edition, 2001 (Unit – II, III & IV)

REFERENCES:

1. M. Krawczak and J. Schmidtke, "DNA Finger printing", BIOS Scientific Publisher, 2nd Edition, 1995
2. Richard Saferstein Ed, "Forensic Science Hand Book" Prentice Hall, 2010 (Unit – IV)
3. P L Carpenter, "Immunology and Serology", W B Saunders Company, 2nd Edition, 1965
4. David Friedfielder, "Molecular Biology", Narosa, 4th Edition, 1995

UNIVERSITY EXAM QUESTION PAPER PATTERN

Max. Marks: 80

Part A: 10 questions of 2 marks each - No Choice

Part B: 5 questions from each of the FIVE units of internal Choice, Each carries 12 marks

Exam Duration: 3 hrs

20 marks

60 marks

B. Tech (Biomedical Engineering)

75

2010 SYLLABUS

SBM1609	FORENSIC SCIENCE	L	T	P	Credits	Total Marks
		3	0	0	3	100

COURSE OBJECTIVE

- ☐ The syllabus is designed to provide a brief and basic knowledge to understand the forensic science particularly to the biomedical student. The main aim is to provide reasonable coverage of subject to know the basic concepts of the science so that the student can implement their knowledge in higher studies.

UNIT 1 ANIMAL CELL STRUCTURE 9 Hrs.

Cell and its inclusions – structure and function – types of cells: Blood & Body fluids – forensic significance – morphological identification of bones – forensic importance.

UNIT 2 BLOTTING TECHNIQUES 9 Hrs.

Identification of Human remains – methods of reconstruction – personal identity in the living and the dead – DNA fingerprinting – PCR - Blotting types (Southern, Northern and Western)

UNIT 3 FINGERPRINTS 9 Hrs.

FingerPrints – importance of plastic and visible finger prints – transfer methods of finger prints – fingerprint patterns – their classification – ridge characteristics – foot prints – importance – gait patterns and their characteristics – photography of foot prints – sunken and surface foot prints.

UNIT 4 TOXINS 9 Hrs.

Forensic toxicology – poison and drugs, classifications, Source, nature, Actions and diagnosis of poisoning cases, postmortem findings and examination, treatment of poisoning cases, medico legal aspects: corrosive agents, irritants – mechanical and animal

UNIT 5 SEROLOGICAL AND CHROMOSOMAL TECHNIQUES 9 Hrs.

Serology – basic principles of serology – concept of antigen and antibody and their reaction – application of serology in forensic science. Karyotyping – banding patterns - chromosomal abnormalities – sex determination – sex linked inheritance.

Max. 45 Hours

TEXT / REFERENCE BOOKS

1. De Robertis, General Cytology, Sannders, 6th Edition, 2008
2. Apurba Nandy, Principles of Forensic Medicine, New Central Book Agency, 2nd Edition, 2001
3. M. Krawczak and J. Schmidtke, DNA Finger printing, BIOS Scientific Publisher, 2nd Edition, 1995
4. Richard Saferstein Ed, Forensic Science Hand Book, Prentice Hall, 2010
5. P L Carpenter, Immunology and Serology, W B Saunders Company, 2nd Edition, 1965
6. David Friedfielder, Molecular Biology, Narosa, 4th Edition, 1995
7. Narayan Reddy, The Essential of Forensic Medicine and Toxicology, 31st Edition, 2012.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 80

Exam Duration : 3 Hrs.

PART A: 10 questions of 2 mark each - No choice

20 Marks

PART B: 2 questions from each unit of internal choice; each carrying 12 marks

60 Marks



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DEPARTMENT OF BIOMEDICAL ENGINEERING

BOARD OF STUDIES – 2018 - 2019 (EVEN Semester)

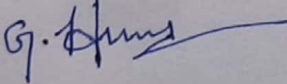
Minutes of the Meeting

02-11-2018

1. The syllabi of SBM1024 – Neuroscience to be reframed as per AICTE and reference can be taken from other reputed institution offering such courses.
2. SBM1607 - Pharmacology & Toxicology – Unit 1,3 – parenteral, Unit 4 – drug development process revised
3. SBM1604 – Brain computer interface has been deliberated as OPEN elective
4. Based on the suggestion of committee members SCS1312 – Fuzzy logic & neural networks was converted into elective from CORE
5. Rehabilitation engineering – Unit V completely changed
6. The members suggested to do the refinement of each course taking care of typographical errors if any and to add newly published books or revised editions.

Members of Board of studies – Biomedical Engineering

EXTERNAL MEMBERS

Dr. G. Harikrishnan, 

Associate Professor & Research Coordinator,
Department of Electrical & Electronics Engg.,
Sree Vidyanikethan Engg. College, Tirupati

INTERNAL MEMBERS

S.No.	Name of the Internal Member	Signature
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2	Dr. J. Premkumar	<i>[Signature]</i>
2	Dr. Anima Nanda	<i>[Signature]</i>
3	Dr. S. Krishnakumar	<i>[Signature]</i>
4	Ms. Sindu Divakaran	<i>[Signature]</i>
5	Ms. Bethanney Janney	<i>[Signature]</i>
6	Ms. A. Sabarivani	<i>[Signature]</i>

HEAD OF THE DEPARTMENT
 DEPARTMENT OF PHARMACEUTICAL ENGINEERING
SATHYANARAYANA
 INSTITUTE OF SCIENCE AND TECHNOLOGY
 (DEEMED TO BE UNIVERSITY)
 Jyoti Baug, Rajiv Gandhi
 600 014

S.No	Course Code	Course Name	Deleted Topics	Added Topics
1	SBMX1023	Pharmacology & Toxicology	UNIT-I Preclinical studies, Clinical trials, Regulatory aspects in drug development, Role of FDA, Important amendments in drugs regulation. Indian drugs and cosmetic act. UNIT-III Analgesic, antipyretic and anti-inflammatory agents, drug in rheumatoid arthritis and gout, drug in bronchial asthma, drug in allergic disorders. Chemical and biological aspects of certain drugs, respiratory drugs, diuretics & prostaglandin's. Unit IV – parental solutions-oral liquids – injections-ointments-topical Applications-ointments preservation Packing – Packing Techniques.	UNIT 1 SYSTEMIC PHARMACOLOGY introduction to pharmacology pharmacognacy, pharmacokinetics Analgesic, antipyretic and anti-inflammatory agents, drug in rheumatoid arthritis and gout, drug in bronchial asthma drug in allergic disorders. Chemical and biological aspects of respiratory drugs diuretics & prostaglandins UNIT 3 PARENTAL PREPARATION Tablets-wet granulation – dry granulation of slugging –coating of tablets Capsules Sustained action dosage forms-parental solutions-oral liquids – injections-ointments topical Applications-ointments preservation Packing – Packing Techniques UNIT 4 DRUG DEVELOPMENT PROCESS 9 Hrs Methods involved in the development of new drugs. Preclinical toxicological studies Calculation of LD50 & ED50 High throughput screening (invitro and invivo) for pre-clinical pharmacokinetic and pharmacodynamic studies. Regulatory aspects in drug development, Role of FDA, important amendments in drugs regulation. Indian drugs and cosmetic act.
2	SBMX1012 / SBM1307	Rehabilitation Engineering	UNIT -V COMPUTER APPLICATIONS IN	UNIT 5 ADVANCED

SBMX1012	REHABILITATION ENGINEERING	L	T	P	CREDITS	TOTAL MARKS
		3	0	0	3	100

UNIT – I INTRODUCTION TO REHABILITATION

10

Introduction Concepts and principles of rehabilitation engineering, Ergonomics - Positioning anatomical site, simplicity and intuitive operation, adaptability and flexibility, mental and chronological age appropriateness. Basics and Fundamentals in Rehabilitation and its applications. Knowledge of disability act 1995 for physically disabled, visually impaired, hearing impaired and others.

UNIT-II MOTOR REHABILITATION

10

Orthopedic prosthetics and orthotics in Rehabilitation Fundamentals, Applications: Computer Aides Engineering in customized component design. Intelligent prosthetic knee. A hierarchically controlled prosthetic hand. A self-aligning orthotic knee joint. Externally powered and controlled orthotics and prosthetics: FES System: Restoration of hand function; restoration of standing and walking. Hybrid Assistive systems (HAS) Active prostheses. Active Above knee Prosthesis. Myoelectric hand and arm prostheses. The MARCUS Intelligent Hand Prosthesis

UNIT – III WHEELED MOBILITY

10

History and Categories of Wheelchairs. Wheelchair Structure and Component Design. Ergonomics of wheel chair propulsion. Power Wheelchair Electrical System. Personal transportation. Auxiliary derives and system.

UNIT – IV SENSORY AUGMENTATION AND SUBSTITUTION

10

Visual System: Visual augmentation. Tactual vision substitution. Auditory vision substitution: Auditory System: Auditory augmentation. Cochlear implantation. Visual auditory substitution. Tactual auditory substitution. Tactual system: Tactual augmentation. Tactual substitution. Augmentative communication, Control and Computer Access: AAC; User Interface: Outputs: Acceleration Techniques.

UNIT –V COMPUTER APPLICATIONS IN REHABILITATION ENGINEERING

10

Interfaces in Compensation for visual perception. Improvement of orientation and mobility. Computer – assisted lip reading. Brain – computer interface. Computer – Aided Engineering in customized component design. Cost – Effectiveness of High Vs Low – Technology Approaches; Intervention and other Issues; Environmental Control and Access to computers.

TOTAL NUMBER OF PERIODS: 50**TEXT BOOK:**

1. Bronzino, "Biomedical Engineering" Hand Book IEEE Press Volume 1 (Unit – II, III, IV & V)

REFERENCES:

1. Robinson C.J, " Rehabilitation Engineering", CRC Press. 1995 (Unit – I)
2. Ballabio E. et al, " Rehabilitation Technology", IOS Press. 1993.
3. Handbook of "Physical Medicine & Rehabilitation", W.B.Saunders Publication, 2003.
4. Hanfredclynes, "Biomedical Engineering System", McGraw Hill, 1999

UNIVERSITY EXAM QUESTION PAPER PATTERN

Max. Marks: 80

Part A: 10 questions of 2 marks each - No Choice

Part B: 5 questions from each of the FIVE units of internal Choice, Each carries 12 marks

Exam Duration: 3 hrs

20 marks

60 marks

SBM1307	REHABILITATION ENGINEERING	L	T	P	Credits	Total Marks
		3	0	0	3	100

COURSE OBJECTIVES

- The course is designed to provide a brief and basic knowledge to understand musculoskeletal, neuromuscular, sensory disorders, prosthetics and orthotics and their applications.
- The main aim is to provide the basic concept so that the students can implement their knowledge for higher studies in developing innovative and effective rehabilitation and assistive technologies.

UNIT 1 INTRODUCTION TO REHABILITATION

9 Hrs.

Introduction Concepts and principles of rehabilitation engineering, Ergonomics - Positioning anatomical site, simplicity and intuitive operation, adaptability and flexibility, mental and chronological age appropriateness. Knowledge of disability act 1995 for physically disabled, visually impaired, hearing impaired and others. Rehabilitation Team.

UNIT 2 ORTHOTICS & ORTHOPROSTHETICS

9 Hrs.

Orthopedic prosthetics and orthotics in Rehabilitation Fundamentals, Applications: Computer Aides Engineering in customized component design. Intelligent prosthetic knee and hand. A self-aligning orthotic knee joint. FES System: Restoration of hand function; restoration of standing and walking. Hybrid Assistive systems (HAS) Active prostheses. Active Above knee Prosthesis. Myoelectric hand and arm prostheses. Orthotics - FO, AFO, TLSO, LSO

UNIT 3 WHEELED MOBILITY

9 Hrs.

History and Categories of Wheelchairs. Wheelchair Structure and Component Design. Ergonomics of wheel chair propulsion. Power Wheelchair Electrical System. Personal transportation. Tricycles.

UNIT 4 SENSORY AUGMENTATION AND SUBSTITUTION

9 Hrs.

Visual System: Visual augmentation. Tactual vision substitution. Auditory vision substitution: Auditory System: Auditory augmentation. Cochlear implantation. Visual auditory substitution. Tactual auditory substitution. Tactual system: Tactual augmentation. Tactual substitution. Alternative and Augmentative communication, User Interface: Outputs: Acceleration Techniques.

UNIT 5 ADVANCED APPLICATIONS IN REHABILITATION ENGINEERING

9 Hrs.

Interfaces in Compensation for visual perception. Improvement of orientation and mobility. Computer - assisted lip reading. Brain - computer interface. Electronic Travel Applications (ETA) : Path Sounder, Laser Cane, Ultrasonic Torch, Sonic Guide, Light Probes, Nottingham Obstacle Sensor, Electro-cortical Prosthesis, Polarized Ultrasonic Travel Aid

Max. 45 Hours.

TEXT / REFERENCE BOOKS

1. Bronzino, Biomedical Engineering, Hand Book IEEE Press Volume 1.
2. Robinson C. J, Rehabilitation Engineering, CRC Press. 1995.
3. Ballabio E. et al, Rehabilitation Technology, IOS Press. 1993.
4. Handbook of Physical Medicine & Rehabilitation, W.B.Saunders Publication, 2003.
5. Hanfredclynes, Biomedical Engineering System, McGraw Hill, 1999

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max Marks: 80

Exam Duration : 3 Hrs.

PART A: 10 questions of 2 mark each - No choice 20 Marks

PART B : 2 questions from each unit of internal choice; each carrying 12 marks 60 Marks

SBMX1023	PHARMACOLOGY AND TOXICOLOGY	L	T	P	CREDITS	TOTAL MARKS
		3	0	0		

UNIT-I 10

Preclinical studies, Clinical trials, Regulatory aspects in drug development, Role of FDA, Important amendments in drugs regulation. Indian drugs and cosmetic act.

UNIT-II 10

A fundamental introduction to solid, semisolid and liquid dosage forms, including powders, true solutions, colloids, suspensions and emulsions.

UNIT-III 10

Analgesic, antipyretic and anti-inflammatory agents, drug in rheumatoid arthritis and gout, drug in bronchial asthma, drug in allergic disorders. Chemical and biological aspects of certain drugs, respiratory drugs, diuretics & prostaglandin's.

UNIT-IV 10

Tablets-wet granulation – dry granulation or slugging –coating of tablets. Capsules Sustained action dosage forms-parental solutions-oral liquids – injections-ointments-topical Applications-ointments preservation .Packing –Packing Techniques.

UNIT-V 10

Environmental toxicants-classification - occurrence-sources-effects on plants. Heavy metal toxicity – lead and Chromium bioaccumulation. Atmospheric toxicants - Carbon monoxide, Sulphur oxides. Pollution indicators definition of indicator plants, algae. Toxins of biological origin - botulins, aflatoxins.

TOTAL NUMBER OF PERIODS: 50

TEXT BOOKS:

1. K. D. Tripathi, "Essential of Medical Pharmacology" 6th edition, Jaypee Brothers medical Publisher(p)Ltd, 2008 (Unit – III)

REFERENCES:

1. Howland et al, "Pharmacology", Lippincott's Illustrated Reviews, ISBN Number:0-7817-4118-1, Third edition, 2006
2. Duffous J.H, "Environmental Toxicology", Edward Arnold Publication, London, 1980 (Unit – V)
3. Sharma P.D, "Environmental Biological and Toxicology", Rastogi & co, Meerat, 1993 (Unit – I)
4. Leon Lachman et al, "Theory and practice of Industrial Pharmacy", Lea and Feiger (Unit – II & IV)

UNIVERSITY EXAM QUESTION PAPER PATTERN

Max. Marks: 80

Part A: 10 questions of 2 marks each - No Choice

Part B: 5 questions from each of the FIVE units of Internal Choice, Each carries 12 marks

Exam Duration: 3 hrs

20 marks

60 marks

SBM1607	PHARMACOLOGY AND TOXICOLOGY	L	T	P	Credits	Total Marks
		3	0	0	3	100

COURSE OBJECTIVE

- Pharmacology is the backbone of present biomedical sciences. The student will be expected to have an introduction to the basic chemical structures and the mechanism of action of drugs in the system. This will enable the undergraduate student to implement this in their dissertation work.

UNIT 1 SYSTEMIC PHARMACOLOGY 9 Hrs.

Introduction to pharmacology, pharmacodynamics, pharmacokinetics, Analgesic, antipyretic and anti-inflammatory agents, drug in rheumatoid arthritis and gout, drug in bronchial asthma, drug in allergic disorders, Chemical and biological aspects of respiratory drugs, diuretics & prostaglandins.

UNIT 2 DRUG FORMULATIONS 9 Hrs.

A fundamental introduction to solid, semisolid and liquid dosage forms, including powders, true solutions, colloids, suspensions and emulsions.

UNIT 3 PARENTAL PREPARATION 9 Hrs.

Tablets-wet granulation – dry granulation or slugging –coating of tablets, Capsules Sustained action dosage forms-parental solutions-oral liquids – injections-ointments-topical Applications-ointments preservation, Packing – Packing Techniques.

UNIT 4 DRUG DEVELOPMENT PROCESS 9 Hrs.

Methods involved in the development of new drugs, Preclinical toxicological studies, Calculation of LD50 & ED50, High throughput screening (invitro and invivo) for pre-clinical pharmacokinetic and pharmacodynamic studies, Regulatory aspects in drug development, Role of FDA, Important amendments in drugs regulation, Indian drugs and cosmetic act.

UNIT 5 ENVIRONMENTAL TOXICOLOGY 9 Hrs.

Environmental toxicants-classification - occurrence-sources-effects on plants, Heavy metal toxicity –lead and Chromium bioaccumulation, Atmospheric toxicants - Carbon monoxide, Sulphur oxides, Pollution indicators definition of indicator plants, algae, Toxins of biological origin - botulins, aflatoxins.

Max. 45 Hours

TEXT / REFERENCE BOOKS

- K.D. Tripathi, Essential of Medical Pharmacology 6th edition, Jaypee Brothers medical Publisher (p) Ltd, 2008
- Howland et al, Pharmacology, Lippincott's Illustrated Reviews, ISBN Number: 0-7817-4118-1, Third edition, 2006
- Duffous J.H, Environmental Toxicology, Edward Arnold Publication, London, 1980
- Sharma P.D, Environmental Biological and Toxicology, Rastogi & co, Meerat, 1993
- Leon Lachman et al, Theory and practice of Industrial Pharmacy, Lea and Feiger 1986
- Goodman Gillman's The Pharmacological basis of therapeutics. Ed. Hardman JG, Limbird LE (Tenth Edition) McGraw Hill press New York. 2001.
- Drug Discovery and Evaluation – Pharmacological assays. Ed. Vogel HG & Vogel WH. Springer-New York. 1997.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 80

PART A: 10 questions of 2 marks each - No choice

PART B: 2 questions from each unit of internal choice; each carrying 12 marks

Exam Duration : 3 Hrs.

20 Marks

60 Marks